

IDENTIFICATION

PRODUCT CODE: MAINDEC-8E-D0JC-D
PRODUCT NAME: RANDOM JMP-JMS TEST
DATE CREATED: JUNE 11, 1971
MAINTAINER: DIAGNOSTIC GROUP
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1. ABSTRACT

THIS IS A DIAGNOSTIC PROGRAM TO TEST THE JMS INSTRUCTION OF THE PDP-8E, RANDOM FROM AND TO ADDRESSES ARE SELECTED FOR EACH TEST, THE JMP INSTRUCTION IS TESTED IN THAT EACH TEST REQUIRES A JMP TO REACH THE JMS.

2. REQUIREMENTS

2.1 EQUIPMENT

PDP-8E EQUIPPED WITH TELETYPE,

2.2 STORAGE

LOCATIONS 0000-0574

THE BINARY LOADER MUST BE STORED IN THE LAST MEMORY PAGE.

2.3 PRELIMINARY PROGRAMS

IT IS ASSUMED THAT MAINDEC-8E-D0A(N), AND MAINDEC-8E-D0B(N) HAVE BEEN RUN SUCCESSFULLY,

3. LOADING PROCEDURE

3.1 METHOD

USE THE STANDARD BINARY LOADER

4. STARTING PROCEDURE

4.1 CONTROL SWITCH SETTINGS

SR0(0) HALT ON ERROR,
SR2(1) HOLD THE FROM ADDRESS CONSTANT
SR2(0) SELECT RANDOM FROM ADDRESSES
SR3(1) HOLD THE TO ADDRESS CONSTANT
SR3(0) SELECT RANDOM TO ADDRESSES

4.2 STARTING ADDRESS

0200

RESTART ADDRESS = 0215

4.3 OPERATOR ACTION

A, SET SR TO 0200 AND PRESS LOAD ADDRESS,

B, IF IT IS DESIRED TO SET EITHER SR2 OR SR3, THE FROM OR TO ADDRESS MAY BE SPECIFIED BY ENTERING THE ADDRESS INTO THE LOCATIONS SHOWN BELOW

FROM = LOCATION 133
TO = LOCATION 131

IF SR2 OR SR3 IS SET AFTER THE PROGRAM HAS BEEN STARTED, THE LAST ADDRESS TAKEN FROM THE RANDOM NUMBER GENERATOR IS USED REPEATEDLY.

C, PRESS CLEAR, AND THEN CONT.

5. OPERATING PROCEDURE

SAME AS SECTION 4,

6. ERRORS

6.1 ERROR HALTS

ALL UNUSED MEMORY LOCATIONS ARE LOADED WITH HLT INSTRUCTIONS. IF THE PROGRAM EXECUTES ONE OF THESE BACKGROUND HALTS, IT IS PROBABLE THAT THE INTERRUPT FAILED TO OCCUR FOLLOWING THE JMS INSTRUCTION. THE FROM AND TO ADDRESS MAY BE CHECKED AT ANY TIME TO LOCATE THE TEST JMS INSTRUCTIONS.

6.2 ERROR PRINTOUTS

F XXXX TO YYYY

(TO) = MMMM

(NNNN) = RRRR

6.2.1 EXPLANATION

(FROM) F XXXX: XXXX = ADDRESS OF JMS INSTRUCTION BEING TESTED.

(TO) TO YYYY: YYYY = ADDRESS THAT THE JMS INSTRUCTION IS GOING TO,

(TO) = MMMM; MMMM = THE CONTENTS OF THE ADDRESS TO, THIS SHOULD EQUAL XXXX + 1.

(NNNN) = RRRR; NNNN IS THE ADDRESS MINUS ONE THAT WAS STORED IN LOCATION 0000 DURING THE INTERRUPT. RRRR IS THE CONTENT OF ADDRESS NNNN.

6.2.2 EXAMPLES

A, THE FOLLOWING IS A FORCED ERROR PRINTOUT WHERE NO ERROR OCCURRED,

F 5236 TO 6354

(TO) = 5237

(6354) = 5237

THE TEST JMS INSTRUCTION WAS IN LOCATION 5236, THE JMS WAS TRYING TO JUMP TO LOCATION 6354, THE CONTENTS OF TO (LOCATION 6354) WAS 5237, THIS IS CORRECT SINCE THE PC IS STORED ON A JMS INSTRUCTION,

TO GAIN ANY KNOWLEDGE FROM THE THIRD LINE OF THE PRINTOUT, THE USER MUST UNDERSTAND THE SEQUENCE OF EVENTS WHEN A JMS INSTRUCTION IS FOLLOWED BY AN INTERRUPT, AS AN END RESULT OF THIS SEQUENCE, THE ADDRESS OF THE LOCATION FOLLOWING THE CELL WHERE THE PC IS STORED IS PLACED INTO CELL 0, TO DERIVE THIS THIRD LINE OF THE PRINTOUT, THE ADDRESS IN CELL 0 IS DECREMENTED BY ONE AND PRINTED ON THE TELETYPE; THEN THE CONTENTS OF THAT ADDRESS ARE PRINTED,

B, THE FOLLOWING IS A TYPICAL ERROR PRINTOUT,

F 5236 TO 6354

(TO) = 7402

(4354) = 5237

LINE 1 IS AGAIN SIMPLY A STATEMENT OF THE PROBLEM, LINE 2 SAYS THAT THE CONTENTS OF LOCATION 6354 ARE NOT 5237 AS THEY SHOULD BE, BUT ARE 7402 INSTEAD, 7402 IS A HLT INSTRUCTION, SINCE MEMORY IS FILLED WITH A BACKGROUND OF HLT ORDERS, IT IS EVIDENT THAT THE PC WAS NOT STORED IN LOCATION 6354 DURING THE JMS,

LINE 3 OF THE PRINTOUT REVEALS WHERE THE PC WAS STORED, SINCE ON THE INTERRUPT 4355 WAS STORED IN LOCATION ZERO AND (4354) CONTAINS THE CORRECTLY STORED PC, 5237, IT IS APPARENT THAT A JUMP ERROR OCCURRED, THE JMS INSTRUCTION SHOULD HAVE JUMPED TO 6354, BUT IT ACTUALLY JUMPED TO 4354, BIT 1 WAS LOST,

C. THE FOLLOWING IS ANOTHER TYPICAL ERROR PRINTOUT,

F 5236 TO 6354

(TO) = 7237

(6354) = 7237

LINE 1 IS AGAIN SIMPLY A STATEMENT OF THE PROBLEM, LINE 2 SAYS THAT THE CONTENTS OF LOCATION 6354 ARE NOT 5237 AS EXPECTED, BUT ARE INSTEAD 7237. SINCE THE CONTENTS ARE NOT A HLT ORDER, 7402, IT IS EVIDENT THAT THE PC WAS STORED HERE, BUT THE NUMBER STORED WAS WRONG, COMPARING THE GOOD (5237), AND THE BAD (7237). IT IS APPARENT THAT BIT 1 WAS "PICKED UP" DURING THE STORE PC OPERATION OF THE JMS INSTRUCTION,

6.3

ERROR RECOVERY

THE PROGRAM CONTINUES TESTING FOLLOWING AN ERROR PRINTOUT, WHEN ENOUGH INFORMATION HAS BEEN GATHERED FROM THE ERROR PRINTOUTS, A FROM AND TO ADDRESS IS SELECTED FOR USE IN THE SCOPE MODE LOOP, ENTER THE CHOSEN ADDRESSES INTO PROPER LOCATIONS (SEE SECTION 4.3.8), ENTER 5534 INTO LOCATION 1 AND RESTART THE PROGRAM WITH SR2 AND SR3 SET,

THE SCOPE MODE LOOP IS:

LOCATION	CODING
0000	
0001	JMP 1 FROM 1
XXXX	A, ION
XXXX	JMS 1 TO
0134	FROM 1 A

TO DISCONTINUE THE SCOPE MODE LOOP, RESTORE THE ORIGINAL CONTENTS (7200) OF LOCATION 1 AND RESTART,

7.

RESTRICTIONS

(NONE)

8.

MISCELLANEOUS

8.1

EXECUTION TIME

4,726 RANDOM TESTS/SECOND

9.

PROGRAM DESCRIPTION

THE JMS INSTRUCTION IS CHECKED THROUGH USE OF THE INTERRUPT FUNCTION, A RANDOM NUMBER GENERATOR SELECTS A FROM AND A TO ADDRESS, AN ION INSTRUCTION IS THEN PLACED AT FROM -1 AND THE JMS INSTRUCTION AT FROM, THE PROGRAM JUMPS TO THE ADDRESS SPECIFIED BY TO, AFTER EXECUTING THE ION AND JMS INSTRUCTIONS, AN INTERRUPT OCCURS STARTING THE PROGRAM COUNTER AT LOCATION 1, A CHECKING ROUTINE LOCATED HERE VERIFIES THAT THE OPERATION WAS SUCCESSFUL BEFORE STARTING THE NEXT TEST,

RANDOM ADDRESSES ARE RESTRICTED AS FOLLOWS: 0600<RANDOM A
ADDRESS<7600

THE AREA BETWEEN 0600 AND 7600 IS FILLED WITH HLT INSTRUCTIONS
IN CASE THE INTERRUPT FAILS,

"JC" IS PRINTED AFTER EVERY 61,000 TESTS,

/RANDOM JMP-JMS TEST
 /SR0{0}=HALT ON ERROR
 /SR2{1}=FIXED FROM
 /SR3{1}=FIXED TO
 /SPREAD HALTS THROUGH MEMORY
 /BETWEEN THE LIMLO AND LIMHI
 /LIMITS

0200	*200		
0200	4157	BEGIN,	JMS PATCH /CLA
0201	1140		TAD LIMLO
0202	7041		CIA
0203	3131		DCA TO
0204	1155	GON,	TAD HALT
0205	3531		DCA I TO
0206	1131		TAD TO
0207	7001		IAC
0210	3131		DCA TO
0211	1131		TAD TO
0212	1141		TAD LIMHI
0213	7640		SZA CLA
0214	5204		JMP GON
0215	1045		TAD M15
0216	3044		DCA CT1
0217	3043		DCA CT

/CHECK FOR FIXED FROM

0220	7604	LOOP,	LAS
0221	7004		RAL
0222	7006		RTL
0223	7630		SZL CLA
0224	5246		JMP LOOP1-6

/GET RANDOM FROM

0225	1136	GETRAN,	TAD RANUM
0226	7104		RAL CLL
0227	7430		SZL THREE
0230	1137		TAD THREE
0231	3136		DCA RANUM
0232	1136		TAD RANUM
0233	7510		SPA
0234	5241		JMP .+5
0235	1140		TAD LIMLO
0236	7710		SPA CLA
0237	5225		JMP GETRAN
0240	5244		JMP .+4
0241	1141		TAD LIMHI
0242	7700		SMA CLA
0243	5225		JMP GETRAN
0244	1136		TAD RANUM

0245	3133	DCA FROM
0246	1133	TAD FROM
0247	7001	IAC
0250	3135	DCA FRMP1
0251	7040	CMA
0252	1133	TAD FROM
0253	3134	DCA FROM1

/CHECK FOR FIXED TO

0254	7604	LOOP1, LAS
0255	7006	RTL
0256	7006	RTL
0257	7630	SZL CLA
0260	5302	JMP CRCK-3

/GET RANDOM TO

0261	1136	GTRAN1, TAD RANUM
0262	7104	RAL CLL
0263	7430	SZL
0264	1137	TAD THREE
0265	3136	DCA RANUM
0266	1136	TAD RANUM
0267	7510	SPA
0270	5275	JMP +5
0271	1140	TAD LIMLO
0272	7710	SPA CLA
0273	5261	JMP GTRAN1
0274	5300	JMP +4
0275	1141	TAD LIMHI
0276	7700	SMA CLA
0277	5261	JMP GTRAN1
0300	1136	TAD RANUM
0301	3131	DCA TO
0302	1131	TAD TO
0303	7001	IAC
0304	3132	DCA TOP1
0305	1133	TAD FROM
0306	7041	CIA
0307	1131	TAD TO
0310	7650	SNA CLA
0311	5220	JMP LOOP

CRCK, TAD FROM

/BRING UP THE FLAG

0312	7040	CMA
0313	6041	TSF
0314	6046	TLS
0315	6041	TSF
0316	5315	JMP -1

/PLACE THE INSTRUCTIONS

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0317 7200 CLA
 0320 1142 TAD ITON
 0321 3534 DCA I FROM1
 0322 1156 TAD JMP1
 0323 3533 DCA I FROM
 0324 3000 DCA 0

/GO DO IT

0325 5534 JMP I FROM1
 0326 7402 HLT

/PRINTOUT SUBROUTINE

TYPAC, 0
 0327 0000 DCA SAVE+3
 0330 3146 TAD SAVE+3
 0331 1146 RTR
 0332 7012 RAR
 0333 7010 DCA SAVE+2
 0334 3145 TAD SAVE+2
 0335 1145 RTR
 0336 7012 RAR
 0337 7010 DCA SAVE+1
 0340 3144 TAD SAVE+1
 0341 1144 RTR
 0342 7012 RAR
 0343 7010 DCA SAVE
 0344 3143 JMP I TYPAC
 0345 5727

/SUCCESS PRINTOUT

SUP, TAD CT1
 0346 1044 IAC
 0347 7001 DCA CT1
 0350 3044 TAD CT1
 0351 1044 TAD CT1
 0352 7640 SEA CLA
 0353 5442 JMP I AL00P
 0354 1373 TAD AMSG2
 0355 3127 DCA WORK
 0356 1127 TAD WORK
 0357 7001 IAC
 0360 3127 DCA WORK
 0361 1527 TAD I WORK
 0362 6046 TLS
 0363 6041 TSF
 0364 5363 JMP I-1
 0365 1046 TAD M303
 0366 7640 SEA CLA
 0367 5356 JMP LP1
 0370 1045 TAD M15
 0371 3044 DCA CT1
 0372 5442 JMP I AL00P

0373	0373	MSG2,	215	/CR	
0374	0215		212	/LF	
0375	0212		312	/J	
0376	0312		303	/C	
0377	0303				
0000	0000	*0			
0001	0000				
0002	5001				
0003	0002				
0004	0003				
0005	0000				
0006	7041				
0007	1135				
0010	7640				
0011	5551				
0012	1132				
0013	7041				
0014	1000				
0015	7640				
0016	5551				
0017	1155				
0020	3533				
0021	1155				
0022	3531				
0023	7040				
0024	1000				
0025	3000				
0026	1155				
0027	3400				
0030	1155				
0031	3534				
0032	7001				
0033	1043				
0034	3043				
0035	1043				
0036	7640				
0037	5442				
0040	5441				
0041	0346				
0042	0220				
0043	0000				
0044	0000				
0045	7763				
0046	7475				
0047	0215				
0050	0212				
0051	0212				
0052	0306				
0053	0240				
0054	0000				

FOR SCOPE MODE INSERT
/JMP I FROM 1 (5534) IN LOC1
/GET STORED ADDRESS

ADDRESS STORED IN (TO) WRONG

ADDRESS STORED IN (0) WRONG

MSG1, 215 /CR
212 /LF
212 /LF
306 /P = FROM
240 /SPACE
0 /X ADDRESS OF JMS INSTRUCTION

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TEST

0140	7200	LIMLO,	-600
0141	0200	LIMHI,	-7600
0142	0001	ITON,	ION
0143	0000	SAVE,	0
0144	0000		0
0145	0000		0
0146	0000		0
0147	0007	MSK7,	7
0150	0260	TW6,	260
0151	0400	AER,	ER
0152	0327	ATYP,	TYPAC
0153	0330	ATYP1,	TYPAC
0154	0047	AMSG1,	MSG1
0155	7402	HALT,	HLT
0156	4531	JMP1,	JMS I

/RESTORE THEN GO AWAY

0157	0000	PATCH,	0	DCA 0
0160	3000			TAD X1
0161	1172			DCA 1
0162	3001			TAD X2
0163	1173			DCA 2
0164	3002			TAD X3
0165	1174			DCA 3
0166	3003			TAD X4
0167	1175			DCA I X5
0170	3576			JMP I PATCH
0171	5557			

X1,	7200	0172
X2,	1531	0173
X3,	5006	0174
X4,	7200	0175
X5,	0200	0176

/TAD I TO

0400	ER	0400
0400	TAD	0400
0401	DCA I	0401
0402	TAD FROM	0402
0403	JMP I	0403
0404	SAVE	0404
0405	AND MSK7	0405
0406	TAD TW6	0406
0407	DCA INS1	0407
0410	TAD SAVE+1	0410
0411	AND MSK7	0411
0412	TAD TW6	0412
0413	DCA INS2	0413
0414	TAD SAVE+2	0414
0415	AND MSK7	0415
0416		0416

0417	1150	TAD TH6
0420	3056	DCA INS3
0421	1146	TAD SAVE+3
0422	0147	AND MSK7
0423	1150	TAD TH6
0424	3057	DCA INS4
0425	1231	TAD ;+4
0426	3552	DCA I ATYP
0427	1131	TAD TO
0430	5553	JMP I ATYP1
0431	0432	
0432	1143	
0433	0147	TAD SAVE
0434	1150	AND MSK7
0435	3064	TAD TH6
0436	1144	DCA INS5
0437	0147	TAD SAVE+1
0440	1150	AND MSK7
0441	3065	TAD TH6
0442	1145	DCA INS6
0443	0147	TAD SAVE+2
0444	1150	AND MSK7
0445	3066	TAD TH6
0446	1146	DCA INS7
0447	0147	TAD SAVE+3
0450	1150	AND MSK7
0451	3067	TAD TH6
0452	1256	DCA INS8
0453	3252	TAD ;+4
0454	1531	DCA I ATYP
0455	5253	TAD I TO
0456	0457	JMP I ATYP1
0457	1143	
0460	0147	TAD SAVE
0461	1150	AND MSK7
0462	3102	TAD TH6
0463	1144	DCA INS9
0464	0147	TAD SAVE+1
0465	1150	AND MSK7
0466	3103	TAD TH6
0467	1145	DCA INS10
0470	0147	TAD SAVE+2
0471	1150	AND MSK7
0472	3104	TAD TH6
0473	1146	DCA INS11
0474	0147	TAD SAVE+3
0475	1150	AND MSK7
0476	3105	TAD TH6
0477	7040	DCA INS12
0500	1000	CHA
0501	3000	TAD 0
0502	1306	DCA 0
		TAD ;+4

0503	3552	DCA I ATYP
0504	1000	TAD 0
0505	5553	JMP I ATYP1
0506	0507	+1
0507	1143	TAD SAVE
0510	0147	AND MSK7
0511	1150	TAD TW6
0512	3112	DCA MSG3
0513	1144	TAD SAVE+1
0514	0147	AND MSK7
0515	1150	TAD TW6
0516	3113	DCA INS13
0517	1145	TAD SAVE+2
0520	0147	AND MSK7
0521	1150	TAD TW6
0522	3114	DCA INS14
0523	1146	TAD SAVE+3
0524	0147	AND MSK7
0525	1150	TAD TW6
0526	3115	DCA INS15
0527	1333	TAD +4
0530	3552	DCA I ATYP
0531	1400	TAD I 0
0532	5553	JMP I ATYP1
0533	0534	+1
0534	1143	TAD SAVE
0535	0147	AND MSK7
0536	1150	TAD TW6
0537	3122	DCA INS16
0540	1144	TAD SAVE+1
0541	0147	AND MSK7
0542	1150	TAD TW6
0543	3123	DCA INS17
0544	1145	TAD SAVE+2
0545	0147	AND MSK7
0546	1150	TAD TW6
0547	3124	DCA INS18
0550	1146	TAD SAVE+3
0551	0147	AND MSK7
0552	1150	TAD TW6
0553	3125	DCA INS19
0554	1154	TAD AMSG1
0555	3127	DCA WORK
0556	1527	TAD I WORK
0557	6046	TLS
0560	6041	TSF
0561	5360	+1
0562	7201	JMP IAC
0563	1127	TAD WORK
0564	3127	DCA WORK
0565	1527	TAD I WORK
0566	1130	TAD M207
0567	7640	SEA CLA

TYPE.

0570 5356
0571 7604
0572 7700
0573 7402
0574 5017

JMP TYPE
LAS
SMA CLA
HLT
JMP RETURN

/HALT ON ERROR

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